Statistical Bulletin

METROPOLITAN LIFE INSURANCE COMPANY

Volume 38 March 1957

Longevity of Diabetics

SINCE the introduction of insulin treatment 35 years ago, the longevity of diabetics has improved greatly, but it is still considerably below that of the general population. This is evident from the table on page 2, which shows for a select group of diabetics and the general population the expectation of life and mortality rates at successive 5-year age intervals from 10 to 70 years. The information on diabetics is based upon an analysis by the Metropolitan Life Insurance Company of the experience of the Joslin Clinic in Boston for the period 1947-51 on patients first treated at the Clinic in the years 1930 through 1951.

At age 10, the expectation of life for a diabetic child in 1947-51 was 44.3 years, or about 17 years less than that in the general population. A 30-year-old diabetic could look forward to 30.1 additional years of life—a disparity of 12½ years. Even at age 50, this disparity was nearly 8 years, the expectation of life for the diabetics being 16.9 years. The relative difference in mortality between the diabetic and general population is much greater than the difference in longevity, particularly at the younger ages. Among children and young adults, the death rates for diabetics were from 5 to 10 times the rates in the general population. The ratio was at least two to one in middle and later life.

While the long-term increase in the longevity of diabetics has been very impressive, the gains in the past decade or more have been relatively slight. However, the latest life table for diabetics actually understates the recent improvement. For one thing, the number of diabetics surviving many years since the onset of their disease has been growing and these long-term diabetics now constitute a considerable proportion of the total diabetic population. Only in fairly recent years, for the first time in medical history, have diabetics whose disease began in early childhood attained age 45, because prior to the introduction of insulin therapy 35 years ago, the disease in children ran a rapidly fatal course. The patients with diabetes

EXPECTATION OF LIFE AND MORTALITY RATE AT SELECTED AGES AMONG DIABETICS AND AMONG WHITE PERSONS IN THE GENERAL POPULATION

Experience in 1947-51 for Diabetic Patients of Joslin Clinic First Observed in 1930-51 and for General Population of United States in 1949-51

Attained Age	Expectation of Life, in Years		Mortality Rate Per 1,000	
	Diabetics*	General Population	Diabetics*	General Population
10	44.3	61.5	2.6	.5
15	40.0	56.7	4.6	.8
20	36.1	51.9	8.0	1.2
25	32.8	47.2	13.1	1.3
30	30.1	42.5	15.2	1.5
35	27.2	37.9	12.6	2.0
40	23.7	33.3	12.2	3.2
45	20.2	28.9	16.1	5.1
50	16.9	24.7	21.6	7.9
55	13.8	20.8	32.2	12.2
60	11.3	17.2	49.8	18.7
65	9.2	13.9	64.9	27.4
70	7.2	10.9	86.3	41.9

*Excludes deaths within one week of first observation or hospital discharge.
Note: Analysis of Joslin Clinic experience by Metropolitan Life Insurance Company.

of long duration often present new medical problems because of the type and frequency of complications to which they are subject. Furthermore, in recent years a significant proportion of the patients coming to the Joslin Clinic for first observation were in this category. It is planned to analyze the Clinic records with respect to the variation in prognosis according to age of patient and duration of disease.

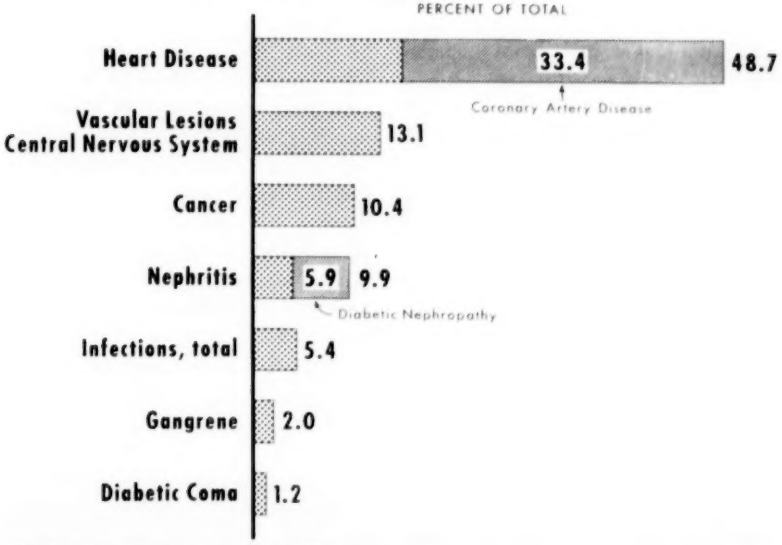
It is not surprising that the longevity of diabetics continues to be well below that for nondiabetics, especially at the younger ages. With available methods of treatment, it is not easy to maintain perfect control over the disease. Diabetics are subject to specific hazards, especially if they lack regular medical supervision. The most obvious of these are diabetic coma, which may be brought on by a deficiency of insulin, and insulin shock, resulting from too much insulin. Moreover, the circulatory system of diabetics seems to degenerate at an earlier age and more rapidly than it does among nondiabetics.

Analysis of the causes of death among diabetic patients of the Joslin Clinic shows that in recent years the diseases of the cardiovascular-renal system have accounted for about three-fourths of the total mortality. As may be seen in the accompanying chart, heart

disease alone was responsible for nearly half the total; two out of every three heart disease deaths were due to coronary artery disease. Next in order were vascular lesions of the central nervous system (cerebral hemorrhage) cancer, and nephritis; the majority of deaths in the latter category were reported as due to diabetic nephropathy, which has come to be recognized as a specific complication of diabetes of long duration. Cancer caused about one-tenth of all the deaths, and infections of all types, only about one-twentieth. Diabetic coma and diabetic gangrene, so common in the past, were responsible for relatively few deaths.

Medical research now in progress may eventually bring new benefits to diabetics. For the mild form common in obese middle-aged people, the prospects seem reasonably good for the development of effective chemical therapy. Extensive trials are under way with chemicals related to the sulfa drugs, but the determination of their value depends upon further investigations on the nature of their action and on their long-term results. At any rate, the door has been opened to new types of therapy.

SELECTED CAUSES OF DEATH AMONG DIABETIC PATIENTS
Experience of Joslin Clinic, Boston, Mass., 1950-56*



*Deaths reported through September 11, 1956.
Note: Analysis by Metropolitan Life Insurance Company

Investigation of the role of hormones in regulating body functions is also yielding knowledge that is helpful in the understanding and treatment of diabetes. Some studies indicate that a significantly abnormal response to the glucose tolerance test after administration of cortisone in nondiabetics with a family history of diabetes selects out those susceptible to the disease. Other studies, using tracer techniques, are throwing new light on the role of body fat, showing that it is not an inert substance, as was previously thought, but is intimately involved in the metabolic exchange mechanism. The relationship of dietary fats to changes in the vascular system is under intensive study by many investigators.

While the many research programs now in progress assure further gains against diabetes in the future, application of present knowledge, in the meantime, can be very fruitful in the control of the disease. Many individuals with a family history of the disease may avoid diabetes by keeping their weight down. Diabetics can profit from careful adherence to prescribed treatment and from education with respect to diet and other details of treatment. Fortunately, the several types of insulin with varying rates of action that are now available permit use of the type best suited to the individual diabetic's needs.

Marriage and Child Dependents

EARLY marriage and family building, traditional in the American way of life, have gained in popularity since World War II.

The median age at first marriage has decreased about 1⅓ years in the past 15 years, and is now about 23 years for men and 20 years for women. At the same time, the married population at the younger ages has increased markedly, the upswing being sharper for males than for females. There are currently more than 1½ times as many married men under age 25 as there were in 1940.

Equally noteworthy is the increase in the proportion of young couples with own children under 18 years of age. At present, somewhat over three-fifths of the married men under age 25 have dependent children, compared with less than one-half in 1940; for family heads aged 25-34, the proportion has grown to four-fifths. The typical father under 35 years of age now has two children in his care, and a considerable proportion have three or more.

The increase in dependent children reflects largely the baby boom incidental to World War II and its aftermath. In each of the past six years, the number of births in the United States reached a new high. By 1956 the number exceeded 4,200,000, in 1950 it was about

3,630,000, and in 1940 not quite 2,560,000.

That the upswing in births has been greatest among young people is apparent from the accompanying table. Babies born in families where the husband is under 20 years of age increased in number from about 40,000 in 1940 to about 98,000 in 1955, a rise of more than 140 percent. Even for married men aged 20-34, the rise in births exceeded 60 percent. In fact, only in families where the man is 55 or over have births failed to increase.

A measure of the present high level of fertility among young couples is provided by the figures

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NUMBER OF BIRTHS AND BIRTH RATE BY AGE OF FATHER*
United States, 1940-1955

Age of Father	1955	1950	1940	Percent Change 1955 Since	
				1950	1940
	Number of Births† (in Thousands)				
All Ages	3,903.0	3,486.3	2,460.4	+12.0	+58.6
Under 20	97.7	64.9	40.4	+50.5	+141.8
20–24	807.4	741.4	483.4	+ 8.9	+67.0
25–29	1,182.7	1,077.3	725.8	+ 9.8	+63.0
30–34	903.4	778.9	559.0	+16.0	+61.6
35–39	518.4	469.5	345.4	+10.4	+50.1
40–44	253.6	222.6	177.4	+13.9	+43.0
45–49	92.8	85.4	81.3	+ 8.7	+14.1
50–54	31.5	29.6	29.9	+ 6.4	+ 5.4
55 and over	15.5	16.7	17.8	− 7.2	−12.9
	Rate per 100 Married Men				
Ages under 55	12.9	12.3	10.5	+ 4.9	+22.9
Under 20	55.8	37.5	37.9	+48.8	+47.2
20–24	32.6	32.9	30.7	− .9	+ 6.2
25–29	27.4	24.2	21.1	+13.2	+29.9
30–34	17.6	16.3	14.2	+ 8.0	+23.9
35–39	10.1	9.8	8.9	+ 3.1	+13.5
40–44	5.4	5.0	4.8	+ 8.0	+12.5
45–49	2.2	2.2	2.3	0	− 4.3
50–54	.8	.8	1.0	0	−20.0

*Estimated by the Statistical Bureau of the Metropolitan Life Insurance Company from various reports by the National Office of Vital Statistics and the Bureau of the Census, and birth statistics supplied by State registrars.

†Legitimate live births, adjusted for underregistration.

Note: Data for 1955 are provisional. Rates computed from births in the United States and population including men in the Armed Forces overseas.

in the lower tier of the table. In 1955, a baby was born into about 56 percent of the families in which the head was under age 20. The proportion was more than one-fourth where he was aged 25-29 and one-sixth for those at ages 30-34. Beyond this age, however, fertility falls off rapidly; past age 50 the annual rate is now less than 1 per 100 married men.

Thus, most American children are born to relatively young parents. In more than one-half of the families which had a baby during 1955, the husband was under 30 years of age; in 90 percent of the total, the father was under age 40.

The earlier phase of the baby boom was characterized by a sharp rise in first and second births. More recently, the boom has been sustained by unusually large numbers of children born in established families. Last year there was a record total of about 1,300,000 third and fourth children born in our country. These babies comprised almost one-third of the total —a higher proportion than for any year since before World War I. Although moderate-size families are becoming more common, it is unlikely that the large families of several generations ago will again become part of the American scene.

Springtime Accident Toll

EARLY spring is the least hazardous time of the year in our country. In the most recent years for which data are available, 1952-54, the daily toll of fatal accidents in March and April was 8 percent below the daily average for the three-year period as a whole and 20 percent below the daily average for June, the peak month; the details are given in the table on page 7. Even so, accidents in the United States take about 235 lives a day in March and April, or approximately 7,000 lives during each of these months.

The fact that motor vehicle accident fatalities are at their lowest level in the early spring accounts, in part, for the relatively favorable over-all accident record in that period of the year. In 1952-54, motor vehicle accidents were responsible for an average of 86 deaths a day during March—an appreciable toll, even though lower than in any other month; this compared with a loss of 102 lives a day for the 12 months as a whole. As the spring season progresses, motor vehicle accident deaths increase in number, undoubtedly reflecting the growing volume of travel. This mounting loss of life is accounted for largely by the rise in frequency of nonpedestrian accidents, such as collisions between automobiles, motor vehicles overturning or running into fixed objects. Nonpedestrian accidents are responsible for about four-fifths of all the deaths from motor vehicle accidents.

Falls, which rank second only to motor vehicles as a cause of accidental death, vary but little in mortality during the year. Yet the relative risk of fatal injury from a fall is slightly lower in the spring than in the other seasons. In April and May, the number of deaths a day were 4 percent below the daily average for the three-year period under review.

As the use of heating facilities diminishes during the spring, the loss of life from fires and explosions decreases. In March the toll is still at a level not much below the peak mortality recorded during the winter season. As the table shows, the average daily number of deaths from fires and explosions decreased from 25 in March to 13 in May and reached a low of 8 in August.

A contrary trend is observed for drownings. As the arrival of moderate weather brings with it greater participation in recreational activities, the frequency of drowning rises. In 1952-54, the average daily number of such deaths, exclusive of drownings in water transportation, increased from about 8 in March to 20 in May, and to a peak of 38 in June. Water transportation accident fatalities, which result largely from the use of small

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MONTHLY VARIATION IN DEATHS FROM SPECIFIED TYPES OF ACCIDENTS

United States, 1952-54

Type of Accident	Year	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Average Number per Day												
Accidents—total	256.6	243.6	241.7	234.9	235.5	248.9	286.8	281.4	260 5	249.1	259.7	263.6	272.4
Motor vehicle	101.6	89.8	89.7	86.0	90.2	96.5	99.1	100.6	112.2	108.9	115.8	112.5	116.8
Pedestrian	21.7	24.4	21.8	18.8	20.6	19.2	18.3	16.8	19.1	21.0	24.3	25.5	30.4
Falls	56.0	58.6	59.6	56.0	53.6	53.6	58.7	56.1	52.6	55.5	54.4	55.9	57.2
Fire and explosion	17.9	26.5	25.8	24.9	17.9	13.3	10.5	9.2	8.2	10.9	17.0	22.5	28.0
Drowning	14.4	4.8	6.8	7.8	11.5	20.4	37.8	33.9	20.8	11.3	6.9	4.9	5.1
Machinery	5.7	3.5	4.4	4.5	6.2	6.9	6.7	6.7	6.3	6.4	7.0	5.5	4.1
Water transport	4.2	1.8	1.9	2.7	4.3	7.8	7.3	7.0	4.9	4.0	3.4	2.7	2.0
	Relative Index*												
Accidents—total	100	95	94	92	92	97	112	110	102	97	101	103	106
Motor vehicle	100	88	88	85	89	95	98	99	110	107	114	111	115
Pedestrian	100	112	100	87	95	88	84	77	88	97	112	118	140
Falls	100	105	106	100	96	96	105	100	94	99	97	100	102
Fire and explosion	100	148	144	139	100	74	59	51	46	61	95	126	156
Drowning	100	33	47	54	80	142	263	235	144	78	48	34	35
Machinery	100	61	77	79	109	121	118	118	111	112	123	96	72
Water transport	100	43	45	64	102	186	174	167	117	95	81	64	48

*Average of daily deaths in specified month as percent of average daily deaths per year.

Source: Various reports of National Office of Vital Statistics.

boats, rise even more rapidly, the number of deaths in May being nearly three times that in March.

Machine accidents likewise record a rising death toll during the spring, coincident with the greater use of tractors, plows, and other outdoor mechanical equipment. In the period under review, the frequency of machine accident fatalities in May was practically the same as in October, the peak month.

Tornadoes and floods are usually the leading natural hazards in the springtime. The loss of life from these hazards fluctuates appreciably from year to year, depending largely upon the number which occur, how extensive they are, and how populous are the areas they ravage.

However, the forces of nature account for a very small part of the total accident death toll in our country during the spring or at any other season. A large proportion of fatal accidental injuries throughout the year result from the disregard of safe practices on streets and highways, in the home, at work and at play. The heavy loss of life from accidents can be reduced through the organized effort of official and voluntary agencies, and the cooperation of an alerted citizenry.

Major Chronic Diseases and Aging

THE chances of acquiring a chronic disease rise rapidly with advance in age. This is evident from the table on page 9, which shows for several major chronic diseases the age variations in the rate at which new cases occur among males and females in the general population. It should be borne in mind, however, that these data, compiled from various sources, are subject to certain limitations. People may have chronic conditions of which they are unaware; moreover, such diseases often develop insidiously, so that in many cases it may not be possible to determine accurately the date of onset.

The cardiovascular-renal diseases (heart disease, hypertension, and nephritis) rise more sharply in incidence with advance in age than do any of the other diseases shown in the table. At the younger ages, a large proportion of the new cases are of infectious origin, but past midlife the chronic cases predominate. The annual number of new cases of heart disease among males rises from 480 per 100,000 at ages 45-49 to more than 4,200 at ages 70-74, and further to about 15,000 per 100,000 at ages 85-89. Among females, the incidence rates are less than those for males in the broad age range 35-84 years. For hypertension, females record the lower rate at ages 55-84, and for nephritis at ages 40 and over.

ANNUAL INCIDENCE OF NEW CASES PER 100,000 POPULATION FOR SPECIFIED DISEASES

By Age and Sex, United States

Age	Heart Disease 1948*	Hypertension 1948†	Nephritis 1948‡	Cancer 1947 ¶	Diabetes Mellitus 1935-36	Mental Disease 1949-51
	Males					
0- 4	§	§	§	23	§	4†
5- 9	59	1	39	16	§	
10-14	42	12	14	14	§	23
15-19	3	25	10	25	§	93
20-24	26	37	21	25	3	163
25-29	74	52	33	36	6	150
30-34	152	75	52	63	11	124
35-39	223	109	73	96	16	120
40-44	302	197	91	169	25	125
45-49	480	314	148	272	40	125
50-54	829	548	246	516	72	137
55-59	1,535	912	384	817	102	154
60-64	2,087	1,465	643	1,208	115	198
65-69	3,046	2,271	1,083	1,533	125	264
70-74	4,236	3,340	1,611	2,107	113	395
75-79	6,061	5,350	2,508	2,644	99	732
80-84	9,751	9,896	4,420	3,091	66	
85-89	14,959	17,411	9,663	3,046[a]	20	1,363[a]
	Females					
0- 4	§	§	§	21	§	1†
5- 9	74	4	16	11	§	
10-14	55	14	[b]	16	§	19
15-19	36	42	16	22	§	83
20-24	55	53	44	31	4	106
25-29	115	67	44	58	10	125
30-34	157	117	55	114	20	129
35-39	206	199	78	193	32	131
40-44	274	323	85	318	54	129
45-49	397	540	129	481	82	137
50-54	678	683	237	663	131	137
55-59	1,024	873	334	850	180	150
60-64	1,511	1,190	499	1,095	198	169
65-69	2,440	1,737	774	1,247	201	219
70-74	3,430	2,655	1,314	1,541	162	372
75-79	4,844	3,868	2,152	1,770	115	708
80-84	8,057	7,398	3,867	2,045	67	
85-89	17,601	18,644	9,141	2,284[a]	20	1,221[a]

* Heart disease, all forms, except syphilitic and thyrotoxic.
† Includes cerebral hemorrhage, high blood pressure, and arteriosclerosis.
‡ Nephritis, all forms, and other kidney diseases.
¶ White persons only.
§ Not available.
[a] Ages 85 and over.
[b] Less than 0.05.

Sources: T. D. Woolsey, "Statistical Studies of Heart Disease: VI. Age at Onset of Heart and Other Cardiovascular-renal Diseases," *Public Health Reports*, Vol. 65, p. 555, April 28, 1950; Mortimer Spiegelman and Herbert H. Marks, "Age and Sex Variations in the Prevalence and Onset of Diabetes Mellitus," *American Journal of Public Health*, Vol. 36, p. 26, January 1946; H. F. Dorn and S. J. Cutler, "Morbidity From Cancer in the United States, Part I," *Public Health Monograph No. 29*, Public Health Service, Washington, 1954; B. Malzberg, "Age and Sex in Relation to Mental Disease," *Mental Hygiene*, Vol. 39, p. 196, April 1955.

According to information available for 10 urban areas in the United States, the incidence of cancer rises quite rapidly with advance in age, except for the childhood ages, where leukemia and malignancy of the brain are the predominant types of the disease. Among males, new cases of cancer increase from 25 per 100,000 at ages 20-24 to more than 100 times that rate at ages 75 and over. Among females, the incidence rate exceeds that for males in the age range 20-60 years, reflecting the frequency at these ages of breast and genital cancers among the women. However, at the later ages, as in the early decades of life, males record the higher rates.

The age pattern for diabetes differs from that for cancer and the cardiovascular-renal diseases in that the incidence rate for this condition rises much more gradually with advance in age and reaches a peak in the late 60's, after which the rate decreases. Females apparently are more susceptible to diabetes than males at all but the later ages. The greatest sex difference occurs at ages 40-44, where the onset rate for women is more than twice that for males. The acceleration in frequency of new cases among women on approach of the menopause is undoubtedly associated with the endocrine changes that are characteristics of that period of life.

The last column of the table on page 9 shows the rates at which new cases of mental disease occur, as measured by first admissions to hospitals for mental disease. During childhood and early adult life the incidence rises with advance in age, but between ages 30 and 55 the rates vary but little. Thereafter, however, the frequency of new cases increases rapidly. Thus, among males, the onset rate rises from about 150 per 100,000 at ages 55-59 to more than 1,300 per 100,000 at ages 85 and over. Among females, the gradient is only a little less sharp. It should be noted that the age pattern for mental disease as a whole is a composite of the age variations for the individual groups of mental disorders. For example, the first admission rates for dementia praecox occur in early adult life, for alcoholic psychoses in midlife, and for senile psychosis at the advanced ages.

Chronic disease is one of the major problems of our older population, and the numbers so afflicted will mount rapidly with the growth in numbers of our elders. Meanwhile, increasing effort is being made to add to the storehouse of knowledge on the nature, prevention, and treatment of these diseases. To the individual still in his productive years who is aware of the uncertainties of health in old age, the funds needed for medical care during that stage of life can be provided in large measure by insurance and savings.

MORTALITY FROM SELECTED CAUSES

Industrial Policyholders, Metropolitan Life Insurance Company

February 1957

Cause of Death	Annual Rate per 100,000 Policyholders*				
	February		Year to Date		
	1957	1956	1957	1956	1955
All Causes†	672.7	654.2	674.5	677.4	673.8
Tuberculosis (all forms)	7.6	7.6	7.5	7.8	8.8
Communicable diseases of childhood	.4	.3	.2	.3	.5
Acute poliomyelitis	—	.1	†	.2	.3
Malignant neoplasms	138.6	129.3	138.3	132.0	132.3
Digestive system	48.0	43.0	47.8	44.6	45.1
Respiratory system	18.0	18.0	19.0	18.0	16.6
Diabetes mellitus	14.5	15.0	14.5	16.5	16.9
Diseases of the cardiovascular-renal system	373.5	358.1	369.3	366.4	363.6
Vascular lesions, central nervous system	70.9	69.0	69.4	71.1	71.0
Diseases of heart	272.8	262.6	271.8	268.8	264.9
Chronic rheumatic heart disease	12.0	12.6	12.3	12.8	14.9
Arteriosclerotic and degenerative heart disease	209.6	205.1	210.1	209.6	203.3
Diseases of coronary arteries	118.5	115.2	120.1	119.8	115.4
Hypertension with heart disease	39.9	35.4	37.8	37.2	37.9
Other diseases of heart	11.2	9.5	11.5	9.2	8.8
Nephritis and nephrosis	9.2	8.7	9.1	8.6	10.1
Pneumonia and influenza	17.2	19.7	18.7	21.2	20.5
Complications of pregnancy, childbirth	1.0	.8	1.0	.8	.9
Suicide	5.2	5.0	5.8	5.2	5.7
Homicide	3.0	1.8	2.8	2.0	2.2
Accidents—total	33.0	35.1	34.0	38.5	34.0
Motor vehicle	12.0	14.3	14.1	16.8	14.2
All other causes	78.7	81.4	82.4	86.5	88.1

*The death rates prior to March 1956 relate to persons insured under Industrial premium-paying policies and persons with Ordinary Monthly Premium Policies for Less Than $1,000; beginning with March 1956, included also are persons with Debit Book Ordinary policies for $2,000 or less.

†Less than 0.05 per 100,000.

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STATISTICAL BULLETIN

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MORTALITY FROM ALL CAUSES

INDUSTRIAL POLICYHOLDERS · METROPOLITAN LIFE INSURANCE COMPANY

(DEC)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1956	7.0	6.5	6.8	6.8	6.4	6.2	5.9	5.9	5.7	6.1	6.0	5.9
1957	6.8	6.7										

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